WEST

Help | Logout | Interrupt

Main Menu | Search Form | Posting Counts | Show S Numbers | Edit S Numbers | Preferences | Cases

Search Results -

Terms	Documents
(industrial adj5 control$4 adj3 system) and (interpret$4 adj5 program)	17

Database: US Patents Full-Text Database; US Pre-Grant Publication Full-Text Database; JPO Abstracts Database; EPO Abstracts Database; Derwent World Patents Index; IBM Technical Disclosure Bulletins

Search: L6

Refine Search | Recall Text | Clear

Search History

DATE: Saturday, December 13, 2003 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
	DB=USPT,PGPB,JPAB,EPAB,DWPI,TDBD; PLUR=NO; OP=OR		
L6	(industrial adj5 control$4 adj3 system) and (interpret$4 adj5 program)	17	L6
L5	(industrial adj5 control$4 adj3 system) and (interpret$4 adj3 (code or instruction) adj5 program)	2	L5
L4	(industrial adj5 control$4 adj3 system) and (interpret$4 adj (code or instruction) adj5 program)	2	L4
L3	(industrial adj5 control$4 adj3 system) and (program adj5 memory) and (execut$3) and (interpret$4 adj (code or instruction) adj5 program)	2	L3
L2	(industrial adj5 control$4 adj3 system) and (file adj5 program adj5 memory) and (execut$3) and (interpret$4 adj (code or instruction) adj5 program)	2	L2
L1	(industrial adj5 control$4 adj3 system) and (file adj5 program adj5 memory) and (execut$3) and (interpret$4 adj code adj5 program)	2	L1

END OF SEARCH HISTORY

WEST

Generate Collection Print

L6: Entry 8 of 17 File: USPT Oct 24, 2000

DOCUMENT-IDENTIFIER: US 6138174 A
TITLE: Industrial control system providing remote execution of graphical utility programs

Abstract Text (1):
Graphically intense utility programs for an industrial control system, requiring the same operating system as is used to run the control program, are run on remote computers having insufficient memory or processing power to support the operating system, by using a shell program executing on a control-computer to run the utilities. The shell program uses the control-computer's operating system except for calls to the remote computer's display or its manual input devices which are routed to a virtual machine updated periodically by communication with the remote machine.

Brief Summary Text (4):
The invention relates to industrial control systems including programmable controllers, and in particular to an industrial control system employing utility programs such as graphical editors and display programs.

Brief Summary Text (8):
During execution of the control program, peripheral-computers may communicate with the control-computer directly or through a network to execute other programs to display a real-time animation of the program or of the operation of the controlled equipment. These programs, not necessary for the core function of the industrial control system, but assisting in the development, troubleshooting or monitoring of the control process, will generally be referred to as utility programs.

Brief Summary Text (16):
Specifically, the present invention provides an industrial control system executing a utility program intended to generate graphical representations of the data of the industrial control system when executed on a stand-alone computer. The industrial control system includes at least one I/O module providing electrical connections with a control process and a peripheral-computer having a graphic display and manual input device and executing a communications program to transmit data from the manual input

Brief Summary Text (19):
Thus, it is one object of the invention to permit utility programs to appear to be operated away from the control-computer on peripheral-computers having insufficient hardware capability to run the operating system of the control-computer or the utility program itself. In this way the latest operating system and its associated development tools may be used for all parts of the industrial control system without undue hardware burdens.

Brief Summary Text (21):
It is another object of the invention to centralize the data storage requirements of the industrial control system improving performance and simplifying protection of critical data at a single location of the control-computer.

Drawing Description Text (2):
FIG. 1 is a perspective view of an industrial control system having a control-computer and remote I/O racks connected on a common communication link also communicating with several peripheral-computers for displaying control data or inputting information from a human operator;

Detailed Description Text (2):
Referring now to FIG. 1, an industrial control system 10 includes a desk top control-computer 12 having an internal communication module 14 allowing it to send and receive messages on a high-speed serial link 18. The control-computer 12 includes a video display 22, keyboard and mouse 24 as are well known in the art.

Detailed Description Text (7):
The memory 54 also includes a control program 58 used for controlling the process 34. The control program 58 is executed by a soft PLC (programmable logic controller) program 60 running as an application under the operating system 56 to simulate a conventional industrial control system executing the control program 58. Soft PLC programs 60 are available commercially from a number of suppliers and serve to either interpret or compile a control program 58 produced with conventional editing programs on a Wintel type platform.

CLAIMS:

1. An industrial control system executing utility programs intended to generate graphical representations of the data of the industrial control system when executed on a computer, the industrial control system comprising:

(a) an I/O module providing electrical connections with a controlled process;

(b) a peripheral-computer having a graphics display and a user input device and executing a communications program to transmit data from the user input computer and to display graphics data received from the control-computer on the graphics display;

(c) a communications link;

(d) a control-computer spatially removed from the peripheral-computer and having a separate bus structure therefrom and exchanging data with the peripheral-computer and the I/O module over the communications link, the control-computer including at least one processor and an electronic memory, the memory holding:

(i) an operating system providing an interface between the control-computer and only programs executed on the control-computer;

(ii) control data including input and output data exchanged through the I/O module with the controlled process and including the control program for processing the input and output data when executed by the processor under the operating system;

(iii) a utility program executable on a stand-alone computer running the operating system, the utility program reading the control data to produce a graphic representation of the control data on a graphics display in response to input from a user input device;

(iv) a shell program when executed by the processor of the control-computer simulating the stand-alone computer running the operating system to execute the utility program by receiving data from the user input device of the peripheral-computer and transmitting graphic data to the graphics display of the peripheral computer;

whereby the peripheral computer does not have the operating system and whereby the utility program may be virtually executed remotely from a peripheral-computer having insufficient processing capability to run the utility program or the operating system required by the utility program.

2. The industrial control system of claim 1

wherein the communications link has a high priority and low priority channel and

wherein the wherein control program operates so that the control-computer receives data from the manual input device of the peripheral-computer and transmits the

graphic data on the low priority channel and;

wherein the shell program operates so that the control-computer exchanges the input and output data with the I/O module on the high priority channel.

3. The industrial control system of claim 1 wherein the graphic data are transmitted in compressed form to the peripheral-computer.

4. The industrial control system of claim 1 wherein the control-computer has multiple processors assignable among multiple processing tasks of different priority and wherein the control program is given higher priority than the utility and shell programs.

5. The industrial control system of claim 1 wherein the manual input device is an alphanumeric keyboard and a cursor control device.

6. The industrial control system of claim 1 wherein the utility program displays a graphical representation of the control program.

7. The industrial control system of claim 6 wherein the utility program received data from the manual input device of the peripheral-computer to change the control program.

8. The industrial control system of claim 1 wherein the utility program displays a graphical representation of the input and output data.

WEST

Generate Collection Print

L6: Entry 12 of 17 File: USPT Sep 21, 1993

DOCUMENT-IDENTIFIER: US 5247693 A
TITLE: Computer language structure for process control applications and method of translating same into program code to operate the computer

Detailed Description Text (12):
In an industrial control system, the physical equipment may be grouped hierarchically into process units, plants and complexes, as noted above. Similarly, the language structure employs a control element which may be organized hierarchically into various levels of control. This basic control entity is referred to as an OPERATION. The control computations within an OPERATION are classified into different categories and each category of function is assigned to a corresponding, specially formatted portion of the program referred to as a PAGE.

Detailed Description Text (54):
Having thus explained the concepts and language structure involved in the invention, it will be apparent that these concepts and structures are utilized and put into practice by writing a translator (i.e., an interpreter or compiler) for accepting statements expressed in this language structure and generating interpreted or compiled program code therefrom. The interpreted or compiled program code provides the actual instructions to the computer, corresponding to the statements written by the control system designer.

WEST

Generate Collection Print

L6: Entry 7 of 17 File: USPT Aug 27, 2002

DOCUMENT-IDENTIFIER: US 6442442 B1
TITLE: System level data flow programming interface for a multi-axis industrial control system

Abstract Text (1):
An industrial control system comprises a first motion control system including a first motor and a first motion controller, a second motion control system including a second motor and a second motion controller, and a user program. The user program is executable by the industrial control system to control the first and second motion control systems. When the user program is displayed to a user, the user program comprises the following graphical elements. In particular, the user program includes a first icon which represents the first motion control system, a second icon which represents the second motion control system, and a third icon which represents a physical relationship between the first and second motion control systems. Finally, also displayed to the user is a plurality of data flow lines that connect the first, second, and third icons and that represent a flow of data between the icons. The various icons are all preferably implemented in an object-oriented programming environment.

Brief Summary Text (3):
This invention relates to programming interfaces for industrial control systems. In a particularly preferred embodiment, this invention relates to a programming interface for an industrial control system in which the control system comprises multiple motion control axes, and in which the programming interface graphically provides the user with data flow information pertaining to the physical relationship between the various motion control axes.

Brief Summary Text (5):
Industrial control systems are used in a wide variety of operations such as manufacturing, processing, packaging and so on. Typically, an industrial control system comprises one or more industrial controllers, such as programmable controllers, which control a plurality of output devices based on input status information from a plurality of input devices.

Brief Summary Text (6):
In a multi-axis industrial control system, the industrial control system also comprises multiple motion control axes. Each motion control axis comprises a motion control system that may include for example a motion controller, a servo drive and an electric motor. Like the other output devices, the various motors of the motion control axes are controlled based on input status information from the plurality of input devices. The motion control axes are controlled in coordinated fashion such that various activities occur in synchronism as required by the controlled process.

Brief Summary Text (8):
Industrial control systems typically operate based on execution of a user program that is tailored to the industrial control system and its intended use. The user program may be executed in the processor module of the industrial controller, or distributed computing techniques may be utilized such that the user program (which may comprise multiple subprograms) is executed both at the processor module and at the motion controllers. In an industrial control system with multiple industrial controllers, the user program may also be executed at the other industrial controllers and any additional motion controllers associated with the other industrial controllers.

Brief Summary Text (13):
However, as industrial control systems have become more complex, this arrangement has been found to be unsatisfactory. In some systems, it is possible to have thirty-two or sixty-four motion control axes in a single industrial control system. In such situations, it is difficult for the user to maintain an understanding of the relationships between the various motion control axes due to the large number of axes in the industrial control system. The relationship between various motion control axes is not readily ascertainable with existing programming interfaces. For example, the gearing relationship between two axes is normally not displayed to the user unless the user clicks on the gear icon to bring up the dialog box that provides additional information. As the number of motion control axes increases, it becomes increasingly cumbersome to have to click on each individual icon to obtain additional information regarding the relationship of the various motion control axes. There is no way to simultaneously display information pertaining to the physical relationship between the various motion control axes in a single, coherent manner.

Brief Summary Text (17):
The present invention overcomes the drawbacks of existing approaches. According to a first aspect of the invention, the invention provides a method of programming an industrial control system comprising connecting a first, second, and third icons with first and second data flow lines and displaying the connection of the first, second, and third icons with the first and second data flow lines to a user. The first icon represents a first motion control axis that includes a first controlled electric motor, the second icon represents a second motion control axis that includes a second controlled electric motor, and the third icon represents a physical relationship between the first motion control axis and the second motion control axis. The connecting and displaying steps (A) and (B) are performed by a programming interface in response to user inputs received at a human-machine interface.

Brief Summary Text (20):
According to another aspect of the invention, an industrial control system comprises a first motion control system including a first motor and a first motion controller, a second motion control system including a second motor and a second motion controller, and a user program. The user program is executable by the industrial control system to control the first and second motion control systems.

Brief Summary Text (23):
Additionally, further advantages are provided where motion control axes are used that are connected to multiple industrial controllers. The preferred programming interface graphically provides the user with concise information regarding the physical relationships between various motion control axes throughout the entire industrial control system, even though some of the motion control axes are coupled to different industrial controllers. The programming interface makes it possible to display this information without cluttering the display with implementation details, such as those pertaining to the network and hardware implementation of the various motion control systems. The programming interface therefore facilitates programming at the system level.

Drawing Description Text (3):
FIG. 1 illustrates an overview of an industrial control system that is programmed using a programming interface in accordance with a preferred embodiment of the invention;

Drawing Description Text (4):
FIG. 2 illustrates a programming interface utilized to program the industrial control system of FIG. 1, in accordance with a preferred embodiment of the invention;

Detailed Description Text (2):
Referring now to FIG. 1, FIG. 1 illustrates an overview of an industrial control system 10 that is programmed using a programming interface in accordance with a preferred embodiment of the invention. The industrial control system 10 comprises a

plurality of industrial controllers such as programmable controller systems 12 that are interconnected by way of a communication network 14. The industrial control system 10 further includes a input devices 16 and a plurality of output devices 17, with the plurality of output devices 17 being controlled by the programmable controllers 12 in response to input status information from the input devices 16. A pair of monitors 18 are disposed on the communication network 14 and are used to monitor I/O status.

Detailed Description Text (3):
In FIG. 1, only two motion control axes are shown. For purposes of simplicity in describing the preferred programming interface, the exemplary industrial control system 10 of FIG. 1 has been made relatively simple, as have the exemplary user programs described below in conjunction with FIGS. 2 and 3. As will become apparent, however, the preferred programming interface can readily be applied to more complex industrial control systems with 32, 64, 128, or more motion control axes and with more complex user programs.

Detailed Description Text (13):
It may be noted that in FIG. 2, the entire workspace 107 is viewable. Ordinarily, depending on the complexity of the industrial control system, it may be necessary to have the user scroll through the user program, such that the workspace is actually larger than what fits on the user's screen at one time. Encapsulation techniques could also be utilized.

Detailed Description Text (19):
From the user standpoint, the programs 105 and 205 cooperate to represent the operation of the system 10 as follows. The program 205 defines sequential operation of the industrial control system 10. The program 205 starts with the execution of the Initiate P-Cam1 command 210 when an input is received, followed by the execution of the Initiate Move1 command 212. The Move1 command 212 in FIG. 3 corresponds to the Move1 icon 110 in FIG. 2. In practice, this correspondence can be programmed by having the user specify a command name in the dialog box for the Move1 icon 110 (e.g., "Move1_EN"). When the user programs the Move1 command 212, the user then invokes the command name that was specified in the dialog box for the Move1 icon 110. Likewise, in a C++ program, the name for the command to initiate Move1 would the command name specified in the dialog box for the Move1 icon 110.

Detailed Description Text (21):
The position references output by the Move1 icon 110 are incremental position references that are provided to the position control loop for the motion control axis 21-1. Although the user specifies a final position when programming the Move1 icon 110, the position control loop is provided with incremental position reference values to control the motor to obtain the commanded position. In practice, the position reference values may be provided every few milliseconds or so in the form of delta position information (change in position since the last update time) rather than absolute position information. The position control loop then compares the actual position of the motor (obtained from a feedback sensor) with a given position reference, and operates to cause the motor to "chase after" the position references until the final position is reached. A preferred method and system that can be used to generate position references in the described manner is disclosed in my copending application entitled "Method and Apparatus for Generating Reference Values for a Motion Control Loop in an Industrial Control System.," filed concurrently herewith. The contents of this application are hereby expressly incorporated by reference.

Detailed Description Text (40):
Additionally, further advantages are provided where motion control axes are used that are connected to multiple industrial controllers. The preferred programming interface graphically provides the user with concise information regarding the physical relationships between various motion control axes throughout the entire industrial control system, even though some of the motion control axes are coupled to different industrial controllers. The programming interface makes it possible to display this information without cluttering the display with implementation details, such as those pertaining to the network and hardware implementation of the various motion control systems. The programming interface therefore facilitates programming at the system level.

CLAIMS:

1. A method of programming an industrial control system, comprising: (A) connecting a first, second, and third icons with first and second data flow lines, the first icon representing a first motion control axis that includes a first controlled electric motor, the second icon representing a second motion control axis that includes a second controlled electric motor, and the third icon representing a physical relationship between the first motion control axis and the second motion control axis; and (B) displaying the connection of the first, second, and third icons with the first and second data flow lines to a user; and wherein the connecting and displaying steps (A) and (B) are performed by a programming interface in response to user inputs received at a human-machine interface.

10. An industrial control system comprising: (A) a first motion control system including a first motor and a first motion controller; (B) a second motion control system including a second motor and a second motion controller; and (C) a user program, the user program being executable by the industrial control system to control the first and second motion control systems, and the user program when displayed to a user comprising the following graphical elements (1) a first icon, the first icon representing the first motion control system, (2) a second icon, the second icon representing the second motion control system, (3) a third icon, the third icon representing a physical relationship between the first and second motion control systems, and (4) a plurality of data flow lines that connect the first, second, and third icons and that represent a flow of data between the icons.

11. An industrial control system according to claim 10, wherein the industrial control system comprises first and second industrial controllers that are coupled to each other by way of a network communication link, and wherein the first industrial controller is coupled to the first motion controller and the second industrial controller is coupled to the second motion controller.

12. An industrial control system according to claim 11, wherein the user program is displayed in a manner that is free of any indication of the interposition of the first and second industrial controllers and the network communication link between the first and second motion controllers.

13. An industrial control system according to claim 10, wherein the plurality of data flow lines represent the flow of position information between the first, second, and third icons.

14. An industrial control system according to claim 13, wherein the position information is incremental position information.

15. An industrial control system according to claim 10, wherein the third icon at least partially defines a relationship that specifies a position of a motor shaft of the second motion control axis relative to a position of a motor shaft of the first motion control axis.

16. An industrial control system according to claim 10, further comprising first and second motion icons and an adder icon, the first and second motion icons being connected to inputs of the adder icon by first and second additional data flow lines, and the output of the adder icon being connected to an input of the first icon by a third additional data flow line.

17. An industrial control system according to claim 10, wherein the first, second, and third icons are implemented as objects in an object-oriented programming environment.

18. An industrial control system according to claim 10, wherein the third icon is a member selected from the group consisting of a position cam icon and a gear icon.

19. An industrial control system according to claim 10, further comprising a fourth icon that provides an input to the first icon, and wherein the fourth icon is a member selected from the group consisting of a move icon, a jog icon, and a time cam

icon.

20. A programming interface for an industrial control system comprising: (A) a first object, the first object being an axis object, the first object being capable of having multiple instances thereof created each of which represents a motion control axis that includes a controlled electric motor; and (B) a second object, the second object being capable of having multiple instances thereof created each of which defines a physical relationship between motion control axes represented by respective ones of the multiple instances of the first object.

21. A method of programming an industrial control system, comprising: (A) connecting first and second icons with a data flow line, the first icon representing a motion control axis that includes a controlled electric motor; and the data flow line representing the flow of a command reference value to the first icon; (B) displaying the connection of the first and second icons with the data flow line to a user; and wherein the connecting and displaying steps (A) and (B) are performed by a programming interface in response to user inputs received at a human-machine interface.

23. A method according to claim 21, wherein the motion control axis is a first motion control axis, wherein the motor is a first motor, wherein the second icon is a CNC interpreter icon, wherein the first icon is a first motion control axis icon and is connected to a first output of the CNC interpreter icon, and wherein the method further comprises (1) connecting a second motion control axis icon to a second output of the CNC interpreter icon with a second data flow line, the second motion control axis icon representing a second motion control axis that includes a second controlled electric motor; and (2) displaying the connection of the CNC interpreter icon to the first and second motion control axis icons with the first and second data flow lines to a user; and wherein the first and second data flow lines all represent the flow of command reference values from the CNC interpreter icon to the first and second motion control axis icons; wherein the CNC interpreter icon is capable of being programmed in a CNC programming language, and interpreting the CNC program thereby created to control the first and second motion control axes; and wherein the connecting and displaying steps (1) and (2) are performed by a programming interface in response to user inputs received at a human-machine interface.

WEST

Generate Collection Print

L6: Entry 4 of 17 File: PGPB Oct 24, 2002

DOCUMENT-IDENTIFIER: US 20020156926 A1
TITLE: Industrial control system with autonomous web server

Abstract Paragraph (1):
An autonomous Web server may be connected to an industrial control system to provide direct access to input and output points through connections between the Web server and the input and output points. Coordination with the programmable logic controller is implemented through a set of lock flags which prevent conflicts either between multiple Web connections or between Web connections and the control produced by the programmable logic controller.

Summary of Invention Paragraph (4):
[0003] Industrial control systems are special purpose computer systems used in controlling industrial processes. Under the direction of a stored control program, a programmable logic controller, being part of the industrial control system, reads inputs from a series of input modules and writes outputs to a series of output modules. The input modules read signals from sensors associated with the industrial process and the output modules provide signals to actuators and the like in the industrial process. The inputs and outputs may be binary, that is on or off or analog, providing a value with a continuous range such as, for the case of inputs, from an analog to digital converter or an encoder.

Summary of Invention Paragraph (8):
[0007] An important component of an industrial control system is the human machine interface (HMI) which allows, testing, troubleshooting and monitoring of the industrial process. Typically HMIs read and write to the I/O image table of the programmable logic controller under the operation of the control program.

Summary of Invention Paragraph (9):
[0008] Often it is desired to monitor an industrial process remotely. The development of the Internet and the Web has raised the possibility of using well known remote communication techniques with Web servers and browsers to implement a remote HMI that could be used on any browser enabled computer. Current proposals for providing Web to an industrial control system envision a Web server module that may plug into a common backplane to communicate with the programmable logic controller. Input and output data is communicated between the I/O module and the programmable logic controller and selectively communicated, under the control of the programmable logic controller, between the programmable logic controller and the Web server module.

Summary of Invention Paragraph (11):
[0009] The present invention provides a Web server module for an industrial control system that may communicate directly with the I/O modules without the intervention of the programmable logic controller. In the preferred embodiment, this is done by the Web server module opening its own connections with the I/O modules independent of the connections opened by the programmable logic controller.

Summary of Invention Paragraph (12):
[0010] This approach yields two important benefits. First it allows a Web-based HMI to be used during the initial set up and troubleshooting of the industrial control system prior to the time when the programmable logic controller is fully operational. By the same token, the Web-based HMI can provide some control capabilities upon rare instances of failure of the programmable logic controller.

Second, after the industrial control system is fully operational, the Web-based HMI of the present invention provides rapid access to I/O data without burdening the programmable logic controller and unfettered by possible execution time restraints of the programmable logic controller.

Summary of Invention Paragraph (14):
[0012] Specifically, then, the present invention provides a Web interface module for an industrial control system including a programmable logic controller for executing an industrial control program. The programmable logic controller communicates over a controller network with I/O modules and the I/O modules send and receive electrical signals to and from an industrial process.

Detail Description Paragraph (2):
[0030] Referring now to FIG. 1, an industrial control system 10 includes generally a rack 12 having a backplane 14 into which a variety of modules 16 may be connected. The modules 16 connect to the backplane 14 using releasable electrical connectors (not shown) so as to allow for different configurations of the control system to match the demands of the control application.

Detail Description Paragraph (16):
[0044] The flag lock (FLOCK) flag 76 prevents conflicts between different remote terminal devices 48 which may be simultaneously communicating with the Web server module 26. When the FLOCK flag 76 is set, the applet programs in the browsers of the remote terminal devices 48 block information from being sent to an output I/O module 28, 28' or 46 from that remote terminal devices 48. A user at a given remote terminal device 48 interested in changing outputs of the industrial control system 10 thus causes the transmission of a message from the remote terminal device 48 to the Web server module 26 first reading the FLOCK flag 76. If the FLOCK flag 76 is already set, the remote terminal device 48 must wait (spin) until it is reset. Once the FLOCK flag 76 is read as reset, the remote terminal device 48 sets the FLOCK flag 76 to prevent changes of the flags (and ultimately outputs) by other users on different remote terminal devices 48 and may send outputs to those outputs whose flags 70 are not set.

Detail Description Paragraph (18):
[0046] At succeeding process block 80, a Web page 67 is transmitted to the browser of the connected remote terminal device 48 including a Java applet that provides for the protocols described above with respect to the FLOCK flag 76 described above and which provides input and output control commands that may be interpreted by the application program 68 for changing I/O values and which provides for a browser-type graphical user interface.

Detail Description Paragraph (26):
[0054] Referring to FIGS. 1 and 3, in an alternative embodiment, the Web server module 26 may be located outside of the rack 12 at a location as indicated by number 26' attached simply to the industrial control network 24. This ability for the Web server to be freely placed at any point in the industrial control system 10 may in fact allow the Web server to be placed in an I/O module or as a separate node on the industrial control network 24 and to be easily retrofit into existing control systems.

CLAIMS:

1. A Web interface module for an industrial control system including a programmable logic controller for executing an industrial control program, the programmable logic controller communicating over a controller network with I/O modules, the I/O modules sending and receiving electrical signals to and from an industrial process, the Web interface module comprising; an Internet interface for connecting to a Web accessing communications medium; a network interface for connecting to the controller network; and a processing unit executing a stored program to communicate directly with at least one I/O module and to pass data between the Web accessing communications medium and the I/O module; whereby communications may be had with the I/O module without intervention of the programmable logic controller.

12. An industrial control system for an industrial control system comprising: a

plurality of I/O modules sending and receiving electrical signals to and from an industrial process; a controller network communicating with the I/O modules; a programmable logic controller attachable to the controller network to execute a stored control program to exchange data with the I/O modules over the controller network to control the industrial process; and a Web interface module including: (a) an Internet interface for connecting to a Web accessing communications medium; (b) a network interface for connecting to the controller network; and (c) a processing unit executing a stored interface program to communicate directly with at least one I/O module and to pass data between the Web accessing communications medium and the I/O module; whereby communications may be had with the I/O module without intervention of the programmable logic controller.

13. The industrial control system of claim 1 wherein the processing unit also executes the stored program to receive a write disable command from the programmable logic controller causing the stored interface program to allow direct reading of data from the I/O module but not direct writing of data to the I/O module; whereby conflicting writing of data to the I/O module is prevented.

14. An industrial control system for an industrial control system comprising: a plurality of I/O modules sending and receiving electrical signals to and from an industrial process; a connected messaging network communicating with the I/O modules; a programmable logic controller attachable to the controller network to execute a stored control program to open connections and exchange data with the I/O modules over the connected messaging network to control the industrial process; and a Web interface module including: (a) an Internet interface for connecting to a Web accessing communications medium; (b) a network interface for connecting to the connected messaging network; and (c) a processing unit executing a stored interface program to open connections on the connected messaging network between at least one I/O module and the Web interface module and to pass data between the Web accessing communications medium and the I/O module; whereby communications may be had with the I/O module without intervention of the programmable logic controller.

15. The industrial control system of claim 14 wherein the processing unit executing the stored interface program also opens at least one connection on the connected messaging network between the programmable logic controller and the Web interface to transfer data between the programmable logic controller and the interface.

16. The industrial control system of claim 14 wherein the connected messaging network is selected from the group consisting of ControlNet, DeviceNet, and EtherNet.

17. The industrial control system of claim 14 wherein the Web accessing communications medium is selected from the group consisting of a wire cable, a fiber optic cable, and a radio link.

18. The industrial control system of claim 14 wherein the processing unit executing the stored interface program opens connections on the connected messaging network with a plurality of I/O modules and wherein the processing unit includes an I/O image table and wherein the passing of data between the Web accessing communications medium and the I/O module separately reads and writes data between the Web accessing communications medium and the I/O image table, and between the I/O modules and the I/O image table; where the transfer of data between the Web accessing communications medium and the I/O is implemented through the I/O image table.

19. The industrial control system of claim 18 wherein the processing unit executing the stored interface program reads and writes data between the I/O image table and the I/O modules in a predetermined order.

20. The industrial control system of claim 14 wherein the connected messaging network comprises a parallel backplane between Web interface module and the programmable logic controller and a serial network between the backplane and the I/O modules.

21. The industrial control system of claim 20 wherein the network interface of the Web interface module attaches to the backplane.

22. The industrial control system of claim 10 wherein the network interface of the Web interface module attaches to the serial network.

WEST

Generate Collection Print

L6: Entry 3 of 17 File: PGPB Jan 9, 2003

DOCUMENT-IDENTIFIER: US 20030009572 A1
TITLE: System, method & Apparatus of providing process data to a client

Summary of Invention Paragraph (14):
[0013] U.S. Pat. No. 6,061,603 discloses an Interface between an Industrial Control System and a Web Browser is known. This System is explained by making reference to FIG. 1.

Summary of Invention Paragraph (44):
[0043] A server application generates an XML type document with meta data being a description of the structure and/or meaning of the data being sent and containing the process data itself. This XML type document is sent to the client computer and is interpreted by an application program of the client computer. It is an important advantage that the content and/or structure of the data contained in the response message is not defined or is only partly defined by the requesting client. Rather, it is defined dynamically by the server both in structure as well as in content.

WEST

End of Result Set

☐ Generate Collection Print

L1: Entry 2 of 2 File: DWPI Feb 5, 2003

DERWENT-ACC-NO: 2003-362384
DERWENT-WEEK: 200334
COPYRIGHT 2003 DERWENT INFORMATION LTD

TITLE: Industrial controller system for factory automation device, has file system having multiple services and execution engine that interprets industrial control program

INVENTOR: JOHNSTON, D A; KAY, J J ; SIEGEL, S B ; URDANETA, S L

PATENT-ASSIGNEE: ROCKWELL AUTOMATION TECHNOLOGIES INC (ROCW), JOHNSTON D A (JOHNI), KAY J J (KAYJI), SIEGEL S B (SIEGI), URDANETA S L (URDAI)

PRIORITY-DATA: 2001US-0918177 (July 30, 2001)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
EP 1282020 A2	February 5, 2003	E	000	G05B019/05
US 20030023616 A1	January 30, 2003		015	G06F012/00

DESIGNATED-STATES: AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI SK TR

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
EP 1282020A2	July 25, 2002	2002EP-0016631	
US20030023616A1	July 30, 2001	2001US-0918177	

INT-CL (IPC): G05 B 19/05; G06 F 12/00

ABSTRACTED-PUB-NO: US20030023616A
BASIC-ABSTRACT:

NOVELTY - A file system residing in a program memory of an industrial controller, has multiple file system services (46). An execution engine (42) residing in the program memory, interprets code from an industrial control program that includes an instruction utilizing one or more of the multiple file system services.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) an editor;

(2) an industrial controller provision method; and

(3) an industrial control program execution method.

USE - For controlling factory automation device.

ADVANTAGE - Supports lean manufacturing by allowing quick reconfiguring of manufacturing environments, allowing user's to load a specific application into the controller on demand without downloading from programming software and allows user's

to purchase smaller memory processes.

DESCRIPTION OF DRAWING(S) - The figure shows the block diagram of industrial controller system.

execution engine 42

file system services 46

ABSTRACTED-PUB-NO: US20030023616A
EQUIVALENT-ABSTRACTS:

CHOSEN-DRAWING: Dwg.2/9

DERWENT-CLASS: T01 T06
EPI-CODES: T01-F01B; T01-F06; T01-J07B; T06-A04B; T06-A07A;